Office of Energy Efficiency and Renewable Energy

Improved Oxygen Sensors for the Transportation Industry

Background

With increasingly stringent federal and state air quality regulations, sensors that measure and help to control exhaust emissions have become increasingly important components of the engine system. Oxygen sensors monitor the air/fuel ratio and help improve gas mileage under a variety of driving conditions. Cost-effective sensors are needed that are highly sensitive and quick to respond.

Accomplishments

- A U.S. Department of Energy-supported research effort between Pacific Northwest National Laboratory and the automotive industry has resulted in the development of a small, thin planar sensor that detects oxygen in exhaust gases and uses this information to control engine performance.
- A tape-casting process was developed that can be used to fabricate all components of the planar sensor. The process uses a water-soluble polymer to hold ceramic powders together prior to sintering.

Benefits

- The polymer used in the fabrication process is environmentally friendly. It eliminates the use of hazardous chemicals and the subsequent organic waste in the process stream.
- These oxygen sensors are potentially lower in cost because they contain no precious metals.
- Small, thin planar sensors use less space, are more precise, and respond faster than conventional sensors.
- Air/fuel sensors will help reach the high mileage goals of the Partnership for a New Generation of Vehicles.

Planar Oxygen Sensor Produced by New Tape-Casting Process

Future Activities

- Work to fully commercialize the tape-casting process.
- Improve process efficiency and product yield.
- Apply tape-casting process to the manufacture of other sensor types.

Partners in Success

DaimlerChrysler Corporation
Ford Motor Company
General Motors Corporation
Pacific Northwest National Laboratory

Contact

Rogelio Sullivan: (202) 586-8042

OFFICE OF TRANSPORTATION TECHNOLOGIES

April 1999